

High Resolution Nannoplankton Biostratigraphy: Abstract

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ABSTRACT

Non-conventional biostratigraphic techniques were successfully used in steering and maintaining two horizontally drilled North Sea wells (H{A}, H{B}) in a restricted target zone (upper third of the reservoir unit). The techniques were initially applied to well A (well nearest site of first horizontal well). Verification of these techniques in both the first horizontal well (HA), and well B (well nearest site of second horizontal well) eliminated the need for drilling, coring, and logging a pilot hole in the HB (second horizontal well). This resulted in a significant savings to Phillips.

These techniques, which provide high resolution nannoplankton zones with finer resolution than the conventional NN/NP or CN/CP zones, were used to subdivide the major Tertiary reservoir unit (reworked Cretaceous Zone, Field Layer ED) of the Ekofisk Field into three units. These techniques include: (a.) population dynamics, (b.) polar ordination, (c.) morphometric analyses, and (d.) synchronous variation of nannofossil assemblages and petrophysical parameters.

1. The middle unit of the reworked Cretaceous zone was defined by a marked increase in the abundance of *Lucianorhabdus cayeuxii* plus the influx of reworked Campanian taxa.
2. Polar ordination of the nannoplankton assemblages through layer ED verified the three subzones, plus the possibility of a fourth.
3. Morphometric measurements of the reworked Cretaceous taxa *Arkhangelskiella cymbiformis* reflected the same three subdivisions.
4. Two "spikes" in Thoracosphere-Calcisphere abundance, which can be used as a proxy for silica abundance, flag two porosity-permeability partitions in the reservoir. These partitions occur at, or near, the subzone boundaries.

The technology, techniques and zonal scheme, was transferred to the Stavanger office and was subsequently used, on wellsite, by paleontologic consultants during the drilling of both horizontal wells.

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